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ABSTRACT

This final report describes the activities and outcomes of Promoting Learning through Active Interactions, a research-to-practice 4-year project that developed, implemented, and validated a five-module curriculum with 25 infants (ages 6-30 months) who are deaf-blind, their parents, and early interventionists. The project had the following objectives: (1) to identify and promote contingent responses to infant behaviors which in turn motivate infant learning and exploration; (2) to identify compensatory interaction strategies which take into account the infants' degree of vision and hearing impairments and other disabilities; (3) to develop, implement, and evaluate "contingency games" as a means of promoting caregiver-infant interaction within the natural context of everyday routines; and (4) to support and develop caregiver satisfaction and feelings of competence in the role of caring for an infant who is deaf-blind. Participants in the project identified an increase in the amount and the quality of communicative interactions between themselves and their infants as well as an increased sense of efficacy in observing and responding to their children's needs. Quantitative evidence suggests meaningful changes in caregivers' behaviors consistent with the project objectives and activities. (CR)

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**Promoting Learning Through Active Interaction
Project PLAI**

**CFDA 84.025S
Final Report
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June 10, 1999**

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PROJECT PLAI EXECUTIVE SUMMARY

Promoting Learning Through Active Interaction - Project PLAI was an innovative research-to-practice project from 9/1/94 to 4/30/99 of California State University, Northridge in collaboration with the SKI HI Institute, Utah State University and early intervention programs serving infants with both visual impairment and hearing loss and their families. The project developed, implemented, and validated a 5 module curriculum with 25 infants who are deaf-blind, their parents, and early interventionists. The project addressed the following objectives:

1. To identify and promote contingent responses to infant behaviors which in turn motivate infant learning and exploration.
2. To identify compensatory interactions strategies which take into account the infant's degree of vision and hearing impairments and other disabilities.
3. To develop, implement, and evaluate "contingency games" as a means of promoting caregiver-infant interaction within the natural context of everyday routines.
4. To support and develop caregiver satisfaction and feeling of competence in the role of caring for an infant who is deaf-blind.

Objectives #s 1, 2, and 3 were addressed in specific modules of the curriculum and accomplished through its implementation. Achievement of Objective # 4 was marked by the caregivers' expressed satisfaction with their participation in the project and a desire to continue to use the new skills they had acquired. Most significantly, they identified an increase in the amount and the quality of communicative interactions between themselves and their infants as well as an increased sense of efficacy in observing and responding to their children's needs. Quantitative evidence suggests meaningful changes in caregiver behaviors consistent with project objectives and activities.

Overview of Project Activities

During the first year of the project (1994-1995), we field tested interview procedures, forms, and the videotaping protocol with 11 infants (mean age of 30.6 months) whose multiple disabilities include visual impairment and hearing loss. These infants had a number of medical needs including gastrostomy tubes, hospitalization, and seizures. They had mild to moderate hearing losses, and vision problems due to cortical visual impairment, retinopathy of prematurity, cataracts, or strabismus. Additional problems included microcephaly, hydrocephaly, and spina

bifida. Their families represented diverse socioeconomic, educational (2 years of elementary school to bachelor's degrees) and cultural (Hispanic, Asian American, African American, and Euro-American) backgrounds. By analyzing videotaped observations of this field-test sample, we identified interactive strategies that were needed to support communication with these infants, developed suggestions for learning activities, and organized the curriculum into a sequence of 5 modules.

During the second to fourth years (1995-1998) we implemented the curriculum, first, in southern California and then in Utah, by training early interventionists to use the curriculum with families. Although 34 infants and families (20 in southern California and 14 in Utah) began baseline procedures to participate in the project, only 25 infants and their caregivers were able to complete all 5 modules of the curriculum, mainly due to the infants' medical needs. Many of these infants had seizures, required medication, and other medical treatments including hospitalization, gastrostomy tube, respirator, tracheostomy, oximeter, and cardiorespiratory monitor. Although hearing aids and glasses were prescribed for some infants, they were either not obtained or worn consistently. Vision problems included cortical visual impairment, refractive errors, retinal problems, coloboma, microphthalmia, and congenital ocular anomalies. Most infants demonstrated some functional vision use. Hearing losses ranged from mild to profound; some infants did not respond consistently to sound. All infants demonstrated moderate to profound developmental delays. Infants ranged between 8 and 33 months (mean age of 19.8 months) when they began the project.

The Project PLAI curriculum was implemented successfully by caregivers of diverse backgrounds, with appropriate support from their early interventionists. These 25 families represented a variety of educational (from only 2 years elementary school to doctoral degrees), socioeconomic, and linguistic backgrounds (African-American, Hispanic, and Euro-Americans).

The 16 early interventionists from 6 different programs who implemented the curriculum successfully with their families had a variety of qualifications: a paraprofessional (high school graduate and parent of a child with a disability), bachelor's degrees in child development, credentials and/or master's degrees in the area of deaf and hard of hearing, visual impairments, area of deaf-blindness, severe disabilities, orientation and mobility, and early childhood special education.

Most early interventionists, participating in the project in southern California, were not

familiar with the key concepts of the curriculum or with direct and systematic instruction. They required significant support in explaining the modules to caregivers. These difficulties resulted in the first three modules taking several months to complete. However, once early interventionists and families became familiar with the curriculum, then implementation became easier and the modules were completed more quickly. Families took between 6 and 21 months to complete the curriculum (an average of 13.8 months). In Utah, the 3 early interventionists had significant training in early intervention and in deaf-blindness. The curriculum complemented the INSITE model and these three early interventionists were experienced in coaching their families.

Evaluation Procedures

A significant amount of data, both qualitative and quantitative were collected on each infant, caregiver, and early interventionist. Data included initial interviews, videotaped observations from baseline, and after Modules 1,3,4 and 5, recording sheets and feedback forms each module; focus group input; and follow-up interviews.

Videotapes of play and bathtime interactions were coded to identify both adult and infant characteristics in the interaction, types of responses and initiations, and the typed of cues used by the caregiver. Findings indicate that 24 out of 25 caregivers benefited from the curriculum emphasis on consistent and appropriate use of cues with their infants and on turntaking strategies to support early communication. On ratings of caregiver interaction, an increase in elaborativeness noted between baseline and post-Module 3 is somewhat consistent with the increase in the use of cues. Elaborativeness involves complementing and extending the infant's actions and responding to behaviors that may be interpreted as communicative. It includes adding cues to the interactive situation to facilitate the infant's understanding. In the first three Modules of the Project PLAI curriculum, emphasis is placed on observing and interpreting the child's behaviors as well as use of cues, thus an increase in these skills suggests success in meeting the goals of Modules 1 - 3. The increase in both directiveness and sensitivity between baseline and post-Module 5 also supports the attainment of project goals. Modules 4 and 5 emphasize attending to and responding to subtle infant cues that may be interpreted as requests for more and turntaking behaviors. Sensitivity reflects the caregivers awareness of the child's signals and their quick and appropriate response to these, behaviors which are directly taught in the PLAI curriculum. Directiveness, on the other hand includes prompting the child to get a response, and directing a child in what to do until an appropriate response is attained. The emphasis on developing the

infant's turntaking and initiating skills found in Modules 4 and 5 support an increase in caregiver's directive behaviors as the caregiver may need to be more directive initially in order to elicit a response from the infant (e.g., set up a specific activity, provide a clear pause, wait for the child's response, prompt a response if needed, etc.).

We conducted annual focus group meetings in California and Utah with caregivers and early interventionists to obtain feedback and evaluate the curriculum and project process. Caregivers' repeated use of key words and concepts emphasized by the curriculum indicates that they "got the point" of the curriculum. Most caregivers could identify strategies they found particularly successful as well as ones they would continue to use with their child. Early interventionists also seemed to benefit from their participation in Project PLAI. In particular, for the early interventionists in California, the project's emphasis on a collaborative process with caregivers and on specific strategies for developing communicative behaviors with these infants, seemed most useful. The Utah early interventionists, who were generally more knowledgeable about working with families and about specific early communication strategies, also benefited from the systematic and individualized application of these strategies as emphasized in the PLAI curriculum. Overall, we can infer that project participants felt that they had learned helpful strategies from the Project PLAI curriculum. Information on the use of anticipatory cues was particularly meaningful, but early interventionists and caregivers also learned to be better observers of their infants and better interpreters of the meaning of their infants' behaviors. Participation in the project seemed to support an increase in communication between caregivers and their infant, resulting in the child's increased awareness of activities and people in the environment.

Implications for Practice

Our experience in Project PLAI activities and the evaluation results have identified several critical needs in providing appropriate early intervention services to infants who are deaf-blind and their families. First, the shortage of qualified personnel serving these infants and families requires concerted preservice and inservice efforts to increase professional competencies. Additionally, the multiple learning needs of infants who are deaf-blind require qualified professionals who can assist families in obtaining the appropriate medical treatments, ophthalmological and audiological services, and other related services. The large Spanish-speaking population in southern California requires the recruitment and training of bilingual

early interventionists, as well as the development of more materials for families in Spanish. Second, the complexity of these infants learning needs demands a team approach which provides opportunities for these service providers to meet and plan together; and requires ongoing professional development opportunities for these service providers. Third, families of these infants, especially receiving services primarily through home visits need regular opportunities to share information with other families and service providers. Spanish-speaking families are more comfortable participating in groups with others who speak their language, and using materials that are in Spanish. These opportunities will become even more essential if California's interpretation (based on IDEA 1997) of "natural environment" as a place which would exist if there were no infants with disabilities- is fully implemented. Finally, given the frequency with which object and touch cues were used with these infants, there is a need to examine and identify the characteristics of tactile cues to determine their particular usefulness for an individual infant and ways to assist the infant's understanding of their meaning.

Project Outcomes

During the past three years, we have provided indepth training on the PLAI curriculum to 39 early intervention personnel in 14 different programs and introductory sessions to almost 2000 service providers and caregivers. We have produced the 5 module curriculum (with handouts for caregivers in English and Spanish), a videotape demonstrating early communication strategies (in English (closed captioned) and Spanish) and a discussion guide to accompany the tape. These materials will be disseminated by Paul H. Brookes Publishing so that the Project PLAI model will be available nationwide. However, our most prized outcome is the positive experiences and increased sense of competence expressed by caregivers as captured in these comments: *"Project PLAI teaches the parents how to communicate, not the children."* *"There's nothing to lose and so much to gain."* *"It's been so helpful and easy for me to learn."* *"PLAI gave us a new way of looking at her- as a caregiver and playmate- rather than as a therapist for medical needs."* *"Thanks to the project we are able to understand the baby more."* *"I put a list of his communication behaviors and cues over his crib in the hospital for the nurses to use."* *"I gave the video and PLAI forms to his new preschool program so they would know how to communicate with him."* *"Now we know how to interact with her and can teach others how to play with her."*

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PROJECT PLAI FINAL REPORT

#HO25S40001

Promoting Learning Through Active Interaction - Project PLAI was an innovative research-to-practice project of California State University, Northridge in collaboration with the SKI HI Institute, Utah State University and early intervention programs serving infants with both visual impairment and hearing loss and their families. This four year project (9/1/94-4/30/99) was designed to facilitate mutually-enjoyable interactions between caregivers and their infants with both visual impairment and hearing loss and to support these infants' early communication development. To achieve these goals, the project addressed four primary objectives:

1. To identify and promote contingent responses to infant behaviors which in turn motivate infant learning and exploration.
2. To identify compensatory interactions strategies which take into account the infant's degree of vision and hearing impairments and other disabilities.
3. To develop, implement, and evaluate "contingency games" as a means of promoting caregiver-infant interaction within the natural context of everyday routines.
4. To support and develop caregiver satisfaction and feeling of competence in the role of caring for an infant who is deaf-blind.

These objectives were accomplished by developing, implementing, and evaluating an early communication curriculum. The Project PLAI curriculum provides caregivers with a step-by-step approach for recognizing their infants' early and subtle communication behaviors and for responding to these contingently, thus encouraging reciprocal interaction. In this way, caregivers develop "contingency games" or reciprocal social interactions with their infants who are deaf-blind. The validation process involved providing inservice training and ongoing support for early interventionists and collecting data at regular intervals on the implementation of the curriculum. Additionally, through our dissemination activities nationally and internationally (see Appendix A), early intervention service providers have indicated that the PLAI curriculum provides a unique and essential intervention model for serving infants with significant disabilities.

Project PLAI Curriculum Process

The Project PLAI curriculum is composed of 5 modules, each of which consists of a

primary goal and several objectives with specific procedures for an early interventionist to use in working with caregivers and their infants (a copy is attached). The goals of the curriculum are as follows:

Module I Interpreting Infant Cues

Goal: Caregivers will have a detailed picture of the ways in which the infant expresses the following: attention and interest; internal states such as pleasure and discomfort; and needs and desires.

Module II Identifying High and Low Preference Objects, Persons, and Events

Goal: Caregivers will develop a thorough understanding of what their infant enjoys and what the infant dislikes.

Module III Establishing Predictable Routines

Goal: Caregivers will create a daily routine which includes several predictable events which the infant is able to anticipate through recognition of certain cues (words, sights, or other sensations).

Module IV Establishing TurnTaking

Goal: To develop a repertoire of familiar turn-taking routines in which caregiver and infant can participate easily.

Module V Encouraging Communicative Initiations

Goal: To increase the infant's rate of communicative initiations for the purposes of obtaining attention from significant others, obtaining a desired object or pleasurable event and expressing rejection.

To begin the curriculum, the early interventionist and caregiver identified the infant's communicative behaviors using the *Comprehensive Communication Interview* to pinpoint the infant's cues and their meaning. Through discussion and review of videotaped observations, the caregiver's natural way of responding contingently to the infant's cues was identified as well. The next step focused on developing a repertoire of contingent responses. The infant's preferred modes of taking in and expressing communication were identified based on the infant's responses to sensory input. Using this information, optimal methods and opportunities for reciprocal communication were created. Examples of strategies for promoting reciprocal communication included providing appropriate additional cues (e.g., through touch, vision, hearing, smell, or movement); providing time for the infant to respond; manipulating the environment to motivate

the infant's response or initiation (e.g. interrupting or pausing during a favorite, familiar activity; withholding a desired object or action; providing a choice between two objects or actions); and imitating infant vocalizations or actions. Through these strategies, contingency games (i.e., exchanges which are mutually satisfying and sustainable) were developed and individualized for each infant and caregiver pair (e.g., "peek-a-boo" "tickle tummy" gonna get you"). Finally, these games and interactive skills were utilized across a number of naturally occurring opportunities within the daily routine of the caregiver/infant pair. Caregivers and early interventionists identified routines which were enjoyed by both infant and caregiver, and through discussion and structured observation they selected natural play times (e.g., playing "peek-a-boo" while dressing the baby, or "tickle tummy" when changing diapers). Individualized contingency games were then matched to identified routines and implemented by caregivers across these natural environments with assistance and feedback from the early interventionist.

Overview of Main Activities

In this final report, we describe the primary processes which contributed to the careful development, thoughtful refinement, and comprehensive evaluation of the curriculum; present validation results, and outline dissemination activities. Because the project involved the collaborative efforts of several personnel, their primary roles are identified to assist the reader's understanding of the project's organization and activities described in this report.

Deborah Chen, Ph.D., Project Co-Director, California State University, Northridge (20% academic year + 25% for 2 1/2 summer months) was responsible for the overall administration of the project and supervision of project coordinators. She trained the project coordinators to use the Teller Acuity Cards and HEAR kit to obtain estimates of the infants' functional vision and hearing, developed the caregiver questionnaires and interview protocol, established and maintained communication with the replication site in Utah, and developed the video which demonstrates the curriculum strategies.

Michele Haney, Ph.D., Project Co-Director, California State University, Northridge (20% academic year contributed by CSU, Northridge + 25% for 2 summer months) developed the videotaping protocol, data collection procedures, and evaluation measures. She was responsible for training the project coordinators/research assistants to code videotapes, supervising the continuous process, preparing performance reports, analyzing data, and summarizing findings.

M. Diane Klein, Ph.D., Project Consultant, California State University, Los Angeles (one day a month) developed the Project PLAI curriculum, had primary responsibility for making revisions based on feedback, and provided consultation on the evaluation methods.

Beverly Simpkin (Year 1-2), Lavada Minor, M.A. (Year 2-4) and Christina Pruess (Year 3-2- bilingual in English/Spanish), Project Coordinators (each 50% calendar year - not more than 100% total each year) recruited families and infants from early intervention programs in southern California, interviewed families and early interventionists, collected videotaped and other data, worked with early interventionists in implementing the curriculum, coded videotapes, and assisted with data analyses.

Linda Alsop, M.Ed., Replication Site Director, SKI HI Institute, Utah State University, (20% calendar year) was responsible for identifying eligible families and infants in Utah, coordinating activities with two other early interventionists, and implementing the curriculum with selected families on her own caseload.

Rosemary VanderMeyden, Replication Site Coordinator, SKIHI Institute, Utah State University, (40% calendar year) interviewed families and early interventionists, collected videotaped and other data, sent copies of tapes and other data to CSU, Northridge.

The southern California project team (Chen, Haney, Klein, Minor, and Pruess) provided inservice training for early interventionists and facilitated focus group meetings in southern California. They met once a month to monitor progress on project activities, discuss particular situations, as needed, provide feedback on curriculum implementation, and to identify next steps. Similarly, Linda Alsop and Rosemary VanderMeyden met monthly in Utah and had a monthly teleconference with Dr. Chen. Drs. Klein and Chen provided inservice training for early interventionists and facilitated focus group meetings in Utah. The project also supported a part-time student assistant and part-time clerical support at each site, resulting in a total of less than 3 full time staff (< two at CSU, Northridge and one at Utah State University) for the project workscope.

Year 1. During the first year of the project (9/1/94-8/30/95) we completed the following activities:

1. A comprehensive review of the literature on care-giver interaction and early communication of infants with disabilities.

2. Development of caregiver questionnaires *Infant's developmental History*, *Caregiver Recognition of Cues*, and the *Comprehensive Communication Interview* (based on Klein et al, 1981)
3. Fieldtest of the caregiver questionnaires and interviews and video tape protocol with older infants with multiple disabilities/visual impairment and hearing loss.
4. Development of a five module curriculum based on the literature review, caregiver interviews, and analysis of field-test videotapes.
5. Development of a project brochure and contacts with relevant early intervention programs.

Field test procedures. We targeted older infants between 2 to 3 years of age in the southern California area because we wanted the younger infants for implementing the curriculum. Three programs (Infant-Family Program of the Foundation for the Junior Blind, Blind Children's Learning Center, and the Santa Barbara Early Start Program) referred a total of 11 infants and their caregivers for the field test activity. Referred families were contacted by phone to explain the project. The project coordinator at that time, Beverly Simpkin visited each infant approximately 3 times. In the first visit, she explained the project further, obtained signed content forms, and completed the *Infant Development History* and *Caregiver Recognition of Cues*. In the second visit, she completed the *Comprehensive Communication Interview* and obtained one videotaped observation of caregiver and infant in a "favorite activity". On the last visit, she completed the second videotaped observation of "bathtime" and obtained the caregiver's signature on an invoice for the small honorarium.

Description of field test infants. These 11 children ranged from 21 to 42 months with a mean age of 30.6 months. Three (27%) wore glasses, three (27%) had gastrostomy tubes, all 11 (100%) had been hospitalized at least once since birth, all 11 (100%) had seizures and were on medication, 6 (54.5%) did not demonstrate functional use of vision, one (9%) did not demonstrate response to sounds while the 10 others (91%) had mild to moderate hearing losses, 6 (54.5%) did not sit or move independently. Five (45.5%) had cortical visual impairment, 4 (36.4%) had retinopathy of prematurity, one had cataracts, and one had strabismus. Additional problems included microcephaly (3 or 27.3%), hydrocephaly, and spina bifida.

Background of field test caregivers. These 11 families represented diverse socioeconomic and cultural backgrounds. Two mothers were single parents. Of the 20 parents involved in the care of these children, 3 (27.3%) had 2-4 years of school, 3 (27.3%) had completed elementary grades,

2 (18.2%) had completed junior high, 7 (63.6%) completed high school, 3 (27.3%) had completed two years of college and 2 (18.2%) had bachelor's degrees. Six families were Hispanic (54.5%), 3 (27.3%) were Euro-American, one was Asian American and one was African American. Five (45.5%) families spoke Spanish, one (9%) was bilingual Spanish/English and 5 (45.5%) were English-speaking. Beverly Simpkin conducted her visits with an interpreter.

Use of field-test data. As a result of the field-test experience, we refined the caregiver interviews (document and procedures) and modified the video taping protocol, for example, by asking the caregiver to identify an activity that both the infant and caregiver enjoyed doing **together**. In the field test, a couple caregivers left their infants to eat by themselves or to play themselves for the "favorite activity." Through these videotaped observations we identified the interaction strategies used with these infants to refine the proposed curriculum. The videotaped observations and caregiver interview field-test data have been analyzed and may be used as comparison data in future articles about Project PLAI.

Year 2. In the second year of the Project (9/1/95-8/30/96) we implemented the curriculum with a total of 9 infants and their parents and 9 early interventionists in southern California. Participants were from the following early intervention programs: CHIME Infant Program at California State University, Northridge, Santa Barbara Early Start Program, Child and Family Services, and a Early Head Start Program. The baseline protocol was similar to that described earlier during the field-test period, however, the use of the Teller Acuity Cards and the HEAR Kit was added to provide additional information on the infants' visual and hearing status. In September 1995, we trained 4 early interventionists to begin the curriculum with 3 caregivers and infants and in Spring 1996, we trained 6 others to begin with their infants. In Spring 1996, two monolingual Spanish-speaking families joined the project, so we required the services of an interpreter for all interactions and had available handouts for parents and recording sheets translated into Spanish. At this time, Lavada Minor (a graduate from our master's program in early childhood special education and a joint doctoral student in special education at California State University, Los Angeles and the University of California, Los Angeles) joined the project to assist in the data collection with Beverly Simpkin. We also subcontracted with Florida State University, Tallahassee to identify the first cohort of 4 infants in that state to begin replication efforts. We conducted our first focus group meeting June 1996 with the assistance of an interpreter. Fifteen

parents and 8 early interventionists participated in it. None of the families had completed the curriculum and several had just begun the process. Both families and early interventionists were positive about their participation in the project. Parents reported "*...it's the first time that an assessment was related to the intervention. What you asked me about was what we worked on.*" "*Now I know what she is trying to tell me. I feel more attached to her.*" They indicated that the curriculum would be helpful as early as 6-9 months of age with their infant. Of the 9 infants in southern California who began the curriculum in Year two, 4 could not complete it because of medical or family situations.

Changes during Year 1 and 2 In the original proposal submitted December 1993, we anticipated that the curriculum model would be implemented with a total of 36 infants (12-36 months), 24 in southern California (Spring 1995- Fall 1997) and 12 in Florida (Fall 1995- Fall 1997). However, this original plan had to be amended (as detailed in continuation proposals March 1995, March 1996 and April 1997) for a number of reasons. First, on January 17, 1994 Northridge and Los Angeles suffered a major earthquake that damaged most of the University buildings and disrupted the usual operations of many early intervention programs. When the project was funded to begin in September 1994, Northridge and the surrounding communities were still recovering from the earthquake and so the recruitment of infants and families took more time than anticipated. Second, we had planned to replicate the curriculum model with 4-6 families a year in Florida through a subcontract with Florida State University, Tallahassee, however by Spring 1996, Dr. Mary Francis Hanline at Florida State University reported that the project had not been able to recruit eligible infants and families. With approval from our project officer, Dr. Charles Freeman, U.S. Department of Education, we changed the replication site to Utah in collaboration with the SKI HI Institute, Utah State University. At the end of the second year, we revised the infant criteria for eligibility. Originally, we had identified 9-12 month olds as the lower age range to begin the project, because we thought that the identification, medical needs of these infants, referrals to early intervention programs, and other issues would take priority during the first year. Based on family input from first focus group (discussed above), we lowered the beginning age criteria to 6 months. In the end, the youngest infants who participated in the project began at 8 months of age. Based on the number of infants who could not continue the project because of health issues, we also discouraged project participation of medically fragile infants.

However, we continued to receive referrals from early interventionists working with infants who had complex medical needs because these families wanted help to interact with their infants. We encouraged these early interventionists to participate in our inservice sessions to acquire the curriculum strategies but included only infants who were reported to be medically stable.

Year 3. During the third year (9/1/96-9/1/97), we continued to implemented the curriculum in southern California with 5 new infants and families, completed 3 infants and continued 2 infants from Year two. We began implementation in Utah with 6 infants and families and 3 early interventionists through the SKI HI Institute and the Utah School for the Deaf and Blind. In southern California, Beverly Simpkin resigned as project Coordinator due to pregnancy and we hired Christina Pruess (a master's and credential candidate in our Early Childhood Special Education Program who is bilingual) to work with Spanish-speaking families and to assist in data collection with Lavada Minor. She completed translation process on the revised recording sheets and parent handouts. Dr. Haney developed the *PLAI Caregiver-infant interaction rating scales (PLAI-CTRS)* based on the Crawley and Spiker (1983) scale for maternal interactions with toddlers with Down syndrome and the protocol for rating the video tapes. In June, we conducted the second focus group meeting in southern California with 8 early interventionists and 13 parents in southern California. Christina Pruess facilitated the small group for Spanish-speaking parents. In July, we held the first focus group meeting in Utah with 3 early interventionists and 11 parents.

Year 4. During the fourth and final year of the project (9/1/97-8/30/98), we continued the curriculum in southern California with 4 infants, added 3 new infants, and completed the curriculum with 10 infants. In Utah 4 additional infants and their families were added to the project. In April, we conducted the second focus group meeting in Utah with 2 early interventionists and 21 parents and in June, we held the third focus group meeting in southern California with 3 early interventionists and 12 parents. For the second time, Christina Pruess facilitated the small group for Spanish-speaking parents. Dr. Chen developed the videotape demonstrating the key strategies and organization of the PLAI curriculum. She worked with Dr. Klein to revise the curriculum. Dr. Haney had primary responsibility to coordinate and conduct data analyses and to complete the evaluation component. We requested a no-cost extension for the project from September 1, 1998 to April 30, 1999. This extension was required so that 6 infants and families in Utah could completed the curriculum by November 1998. We completed the final

revisions to the curriculum based on feedback. In Spring 1999, the parent handouts and recording sheets were back-translated to check the Spanish translation, the 30 minute videotape was finalized, closed captioned, and also produced in Spanish. Data analysis was completed and the validation results were documented by the end of May.

Description of Infants

The project targeted infants between 6 and 30 months of age, with both visual impairment and hearing loss, and who were not yet using symbolic communication. Given the focus of the curriculum on early communication, infants who participated in Project PLAI had significant and multiple disabilities in addition to visual impairment and hearing loss.

Although 34 infants and families (20 in southern California and 14 in Utah) began baseline procedures to participate in the project, only 25 infants and their caregivers were able to complete all 5 modules of the curriculum and participate in required activities. Of these 25 infants, 12 (48%) has gastrostomy tubes, 8 (32%) were on respirators, 13 (52%) had been hospitalized at least once since birth, 12 (48%) had seizures, 7 (25%) had tracheostomies, one had an oximeter, and one had a cardiorespiratory monitor. Nine (36%) of the infants had hearing aids and 8 (32%) had glasses but few of these infants wore their glasses or hearing aids consistently. Cortical visual impairment was the most common cause of vision loss, occurring in 15 (60%) infants, 8 (32%) had refractive errors (4 or 16% in addition to CVI). Vision problems were also a result of retinal problems, coloboma (4 or 16%), microphthalmia, congenital ocular anomalies. Two infants (8%) had light perception and 5 (20%) demonstrated no functional vision use. Eleven infants (44%) had slight to mild hearing losses while 14 (56%) had moderate (7 or 25%), severe (4 or 16%), or profound (3 or 12%) hearing loss. However, 9 (35%) demonstrated no consistent response to sound. All infants demonstrated moderate to profound developmental delays, 13 (52%) could not sit or move independently.

The disabilities of the infants were related to a number of syndromes and diagnoses including Down syndrome, CHARGE (4 or 16%), Wiskott Aldrich, Trisomy 18, and other chromosomal abnormalities (translocation 3 and 7), Leber's congenital amaurosis, microcephaly (3 or 12%), hydrocephaly, brain malformation, and multiple congenital anomalies. Infants ranged between 8 and 33 months (mean age of 19.8 months) when they began the curriculum and were between 14 and 50 months (mean age of 31.6 months) they completed it. Families took between 6

and 21 months to complete the curriculum (an average of 13.8 months). Originally, we had anticipated that it would take about 6 months to complete the curriculum. Although 6 (24%) families completed the curriculum in 6 to 8 months, in most cases, the infant's medical needs, hospitalization, family situations, and other factors (e.g., early interventionist's schedules and priorities, snow in Utah) contributed to an extended period for implementation.

Family Backgrounds

The Project PLAI curriculum was implemented successfully by caregivers of diverse backgrounds with appropriate support from their early interventionists. These 25 families represented a variety of educational, socioeconomic, and linguistic backgrounds. One (4%) family was African-American, 9 (36%) families were Hispanic, and 15 (60%) families were Euro-Americans. Five (20%) families spoke Spanish, three (12%) were bilingual English/Spanish, and 17 (68%) spoke only English. Three (12%) mothers were single parents and one primary caregiver was the child's grandmother.

Of the 47 parents (including one grandmother) involved directly in their infant's care, one (2.1%) had only two years of school, 5 (10.6%) had completed elementary school, 3 (6.4%) had completed junior high, 11 (23.4%) were high school graduates, 5 (10.6%) had taken some college courses, 6 (12.8%) had completed two years of college, 9 (19%) had a bachelor's degree, 5 (10.6%) had master's degrees, and 2 (4.3%) had doctorates.

Backgrounds of the Early Interventionists

In southern California participating early intervention programs included both private and public programs. Project families who completed the curriculum process were served by one of the following: the Child and Family Services (private), Infant-Family Program of the Foundation for the Junior Blind (private), the Los Angeles Unified School District Program for Deaf and Hard of Hearing Infants (public), the Los Angeles Unified School District Parents and Visually who are Visually Impaired Together (PIVIT) (public), and the Santa Barbara Early Start Program (public). In Utah, families received services from the Early Intervention Deaf-Blind Services of the Utah Schools for the Deaf and Blind (public). Some early interventionists (5) had more than one family participating in the project and some families (3) had more than one early interventionist participating in the project.

Of the 16 early interventionists who completed the curriculum with their families, one

(6.3%) was a paraprofessional (high school graduate and parent of a child with a disability), two (12.5%) had credentials and master's degrees in the area of deaf and hard of hearing, one (6.5%) had a credential in the area of visual impairments, one (6.5%) in the area of deaf-blindness and a master's degree, 5 (31.3%) had bachelor's degrees in child development or related fields with minimal training in early intervention, two (12.5%) had master's in special education (one in orientation and mobility and the other in severe disabilities- but minimal background in early intervention), 3 (21%) were completing their master's degrees and credentials in Early Childhood Special Education, and one (6.3%) was working on a credential in early intervention with a specialization in the deaf-blind area (Utah)

Additional personnel from Infant Family Services (2- private) , Early Head Start (1-public), Blind Children's Learning Center (1-private), CHIME Infant Program (1- private), Kern County Early Start Program (1- public), Ventura County Infant Program(1- public), and the Tracy Infant Program (1- public) also received training on the curriculum but their infants and families did not complete the curriculum because of medical or other family situations. These personnel included one paraprofessional (high school graduate), one with a master's degree in special education, three with master's degrees and credentials in Early Childhood Special Education, two with master's degrees in Special Education, one with a credential in the area of deaf and hard of hearing, one with a bachelor's degree in child development. The three part-time project coordinators, Beverly Simpkin (Years 1-2), Lavada Minor (Years 2-4), and Christina Pruess (Years 3-4) had or were completing their master's degrees/and certification in Early Childhood Special Education. They were also trained to implement the curriculum with caregivers and infants and to support the staff of the participating early intervention programs. In addition, Dr. Klein trained a cohort of 12 early interventionists in a single southern California school district to use the Project PLAI curriculum. These early interventionists have degrees in early childhood special education and/or credentials in the area of visual impairment or severe disabilities and serves a variety of infants with disabilities. In total, 39 (36 in southern California and 3 in Utah) personnel working with infants with a variety of disabilities, severe and multiple disabilities, visual impairments, hearing loss, or combinations of these disabilities, have received in depth training on the curriculum during the project. These activities validated the usefulness of the curriculum not only with diverse families and infants who are deaf-blind but also with early interventionists who had a range of

qualifications, given appropriate inservice training and support

Training Early Interventionists

After baseline data were collected, early interventionists were trained to implement the curriculum with caregivers during their regular homevisits with the infant. Although home visits were scheduled regularly (weekly to biweekly), a number of factors (e.g., illness or hospitalization of the infant, family situations, appointments, IFSP meetings, or winter in Utah) interfered with this schedule. We used videotape segments and interview information as essential examples in the inservice training with early interventionists. In turn, these examples were used by early interventionists to assist caregivers in using the strategies described in selected objectives of the curriculum. Early intervention staff in southern California received training and support from the project in the following phases: in 1995-1996, Drs. Chen, Haney, Klein provided four half day sessions to train the first cohort of 3 early interventionists and 4 team members to implement the curriculum. In 1996-1997 we trained an additional cohort of 9 early interventionists and their 5 team members to implement the curriculum as well. A final cohort of 5 early interventionists received training in Spring and Fall 1997. In Utah, Drs. Chen and Klein provided two separate one day sessions (Spring 1997 and Summer 1997) to three early interventionists (including Linda Alsop who coordinated the replication effort) and two support team members from the SKIHI Institute. The inservice training sessions were structured to also obtain progress reports from the early interventionists.

Most early interventionists, participating in the project in southern California, were not familiar with the key concepts of the curriculum or with direct and systematic instruction. They required significant support in explaining the modules to caregivers. Early interventionists who had received graduate training in early childhood special education, were not proficient in interviewing or coaching families, or in maintaining contact to complete an objective when the infant is sick or the home visit is cancelled. They were not skilled in working with caregivers who were not accustomed to: (a) interacting with their infants in consistent ways, (b) making notes of observations, or (c) remembering what they had tried. These difficulties resulted in the first three modules taking several months to complete. However, once early interventionists and families became familiar with the curriculum, then implementation became easier and the modules were completed more quickly.

In California, the two part-time project coordinators provided follow-up support activities with the early interventionists: discussing parts of the target module, providing examples of how particular objectives might be implemented, modeling how concepts might be explained to parents, and demonstrating how to complete the data collection sheets. In addition, they were responsible for collecting baseline and ongoing data through interviews and videotaped observations.

In Utah, the 3 early interventionists had significant training in early intervention and in deaf-blindness. The curriculum complemented the INSITE model and these three early interventionists were experienced in coaching their families. The curriculum was revised based on feedback from each cohort to increase usefulness. In particular, selected recording/data collection sheets were modified or deleted, and Modules 4 and 5 were revised to simplify implementation. Similarly, we revised the training sessions with early interventionists to provide more opportunity for video observations and small group discussion.

Evaluation Procedures

A significant amount of data, both qualitative and quantitative were collected on each infant, caregiver, and early interventionist. Data included initial interviews, videotaped observations, recording sheets from modules, feedback forms, focus group input, and follow-up interviews. Baseline data were gathered through parent interviews including the *Comprehensive Communication Interview for the Family* to identify the infant's communicative intents, means, behaviors, and opportunities. Similar information was obtained from the early interventionist using the *Comprehensive Communication Questionnaire for the Early Interventionist*.

Two ten minute video taped observations were obtained of the caregiver giving the infant a bath and in an enjoyable activity e.g. play. The infant was videotaped in an "alone" situation and also in an intervention activity with the early interventionist. Infants and caregivers were videotaped at play and bathtime after they have completed module 1,3,4, and 5. The early interventionist and infant were videotaped during a typical intervention activity at the end of module 5. Videotapes were coded to identify both adult and infant characteristics in the interaction, types of responses and initiations, and the typed of cues used by the caregiver.

After each module, the early interventionist submitted a feedback form on the implementation process. At the end of the project, a follow-up questionnaire was sent to parents

(some parents were interviewed by phone) and early interventionists to gather information on their current use of communication strategies and reflection on their participation in the project. One family and two early interventionists had relocated, and one family was not available for the follow-up interview, so these data do not represent all participants who completed the curriculum.

Evaluation Results

Caregivers' Success in Completing Project Activities

One of the ways we monitored the success of the project was through recording (data) sheets collected from participating caregivers as they completed each of the five Project PLAI curriculum modules. These data sheets corresponded to the main activities presented in each module and thus they reflect caregivers' success in completing each activity. Twenty-seven caregivers who began the curriculum completed recording sheets for Modules 1 & 2. Twenty-five of these caregivers completed the curriculum and documented their activities on recording sheets for Modules 3, 4, & 5. A review of the information gathered in this manner is presented below.

Module 1. A total of 27 caregivers were able to complete the activities presented in this module. The first activity required caregivers to describe their daily schedule. Only one caregiver was unable to identify any predictable daily schedule. Seven caregivers (26%) were able to articulate 3 to 7 activities as predictable and routine, while 19 (70%) caregivers identified 8 or more predictable activities. Caregivers indicated that their daily routines were somewhat influenced by the infants' medical needs. Families in Utah indicated that their summer schedules varied from their "warmer" weather routines.

In the next activity, caregivers were asked to observe their babies and identify various states of arousal exhibited by the babies. Seven of the 27 caregivers (26%) were unable to identify any clear state. Active/alert times were identified by 19 of the caregivers (70%), "drowsy" was identified by 17 of the caregivers (63%), "fussy" was identified by 13 caregivers (48%), and "quiet alert" was noted by 11 caregivers (41%). We used the common categories observed in nondisabled infants (Brazelton, 1973) and added "*repetitive behaviors*" (i.e., self-stimulating behaviors) and "*dazed*" to the list of possible states. "*Repetitive behaviors*" have been observed in very nondisabled infants but tend to be prolonged in infants who are deaf-blind. Similarly, "*dazed*" or "*timed out*" states among children with severe and

multiple disabilities have been documented through clinical experience and in the literature on children with severe and multiple disabilities (Guess et al., 1993). Caregivers indicated positive reactions to using "normal" infant state categories to describe their infants with multiple disabilities. They appreciated the project's emphasis on developmental perspectives. Ten of the caregivers (37%) observed their babies engaged in "*repetitive behaviors*", 9 caregivers (33%) observed "*crying*" as a state, 4 (15%) identified "*dazed*," and 2 (7%) identified "*agitated*." No other states were noted.

Caregivers were also asked to identify behaviors used by their infants to gain their attention. Of the 27 caregivers, 11 (41%) were unable to identify attention getting behaviors, 7 (26%) identified 1 to 3 attention getting behaviors used by their infants (most common was crying), while 9 (33%) identified 4 or more attention getting behaviors.

Following a homevisit in which the early interventionist discussed relevant concepts, caregivers were asked to observe their infants, identify an observable behavior (B), and note the antecedents (A) and the consequences (C) for that behavior (the A-B-C activity). All 27 caregivers were able to identify at least 3 instances in which there was a clear A-B-C. Caregivers later reported that this activity helped them see their infant as having purposeful or meaningful behaviors as well as recognize how their actions helped support these behaviors. The A-B-C activity was one of the most challenging for the majority of early interventionists who had not had previous training in direct instruction or behavioral approaches. We provided considerable support in the inservice sessions and follow-up support with early interventionists to assist in the understanding of this concept and in application of this strategy with caregivers.

Module 2 In this module, caregivers were initially asked, in an interview format, to identify their infants likes and dislikes. All of the 27 caregivers were able to identify some of each. Next, caregivers were asked to observe how their infants responded to the presentation and removal of familiar and unfamiliar objects, activities, and people. Twenty-four caregivers (89%) filled out the data sheets accompanying this activity; each identified variations in their infants responses to at least 3 presentation/removal situations. Most of the infants had clear ways of communicating whether they liked or disliked something presented or removed, from increased focus or relaxed tone to sustained interaction in the case of "likes", and from

withdrawal to fussiness and crying in the case of "dislikes." Caregivers later reported that this activity helped them view their babies as more communicative. In addition, infant responses to objects, people, and activities were used to identify the sensory input that was most accessible to each infant, to identify characteristics of what the infant "liked" and "disliked", and to determine what cues might be used within daily activities. For example, one parent reported that her son did "not like" his grandfather. When the parent analyzed the situation, she determined that the grandfather liked physical "rough and tumble" play which startled the infant. This analysis led to the grandfather's use of anticipatory cues and to the infant being more cooperative in play with his grandfather. In a videotaped observation, it was apparent that an infant "liked" a musical toy which he held against his ear when he had discarded bells, and rattles, and other sound-making toys. Given this infant's hearing loss, a continuous sound source placed against his ear provided accessible auditory stimulation whereas a bell or rattle made an intermittent sound that was further away and required fine motor coordination.

Module 3. In this module, the concept of a predictable daily routine was revisited through several activities. First, caregivers were asked to review their earlier statements in the Module 1 about their daily schedule and note whether there were any changes to this schedule. Of the 25 caregivers who completed this activity, 2 (8%) identified no change (from Module 1), 2 (8%) identified up to 7 routine activities (with changes from Module 1), and 21 (84%) identified 8 or more routine activities (with changes from Module 1). Overall, caregivers noted more differentiation of activities and more recognition that certain common actions were part of their predictable routine. In Module 1, for example, most caregivers identified major activities such as waking, eating, playing, and napping. By Module 3, caregivers were including smaller activities such as hugs, putting lotion on, sitting with dad, putting the bib on, and rides in the car. This suggests that they were placing more emphasis on predictability, having learned its benefit for their children.

After receiving information about subroutines and different types of cues, all 25 caregivers were able to identify a predictable subroutine within a routine, 23 (92%) identified 2 or more predictable subroutines. Bathtime subroutines were identified by 14 of the 25 caregivers (56%), feeding subroutines by 12 caregivers (48%), dressing subroutines by 8 caregivers (32%), bedtime subroutines by 3 caregivers (12%), and playtime subroutines by 2.

caregivers (8%). In addition, 24 caregivers (96%) identified and attempted to use new, more meaningful cues within their identified subroutines (the other caregiver worked on more providing more specific verbal input). These 24 caregivers were asked to document their children's responses to these new cues: 6 documented no observable response (25%), 7 (28%) documented observable responses within one subroutine, and 11 (46%) documented observable responses within 2 subroutines.

Module 4 In this module, caregivers learned how to use various strategies to encourage their children to request more of an activity and to extend turntaking within an activity. Twenty-four out of 25 caregivers (96%) documented an attempt to elicit a request for more. Of these, 23 (96%) documented some action on their child's part that they could interpret as meaning "more." Twenty-two of these 23 caregivers (92%) went on to attempt to extend turntaking within a familiar activity, 17 of these (77%) were able to elicit clear turns (2 or more), 5 (23%) identified a child action that could be a turn but was unclear. Two of these caregivers did not note new turntaking games. New games were documented by 22 (2 who had not attempted extended turntaking) out of 24 caregivers, of these 20 (91%) identified clear turns within new activities, 1 (4.5%) identified an unclear turn, 1 (4.5%) noted no response to the new activity.

Finally, caregivers were asked to teach a developed turntaking activity to another person (e.g., grandparent, sibling, baby-sitter) so that the children would have an opportunity to generalize the concept of turntaking to others. Twenty-three caregivers (96%) attempted this at least once, 21 (91%) of these caregivers noted a successful turntaking activity.

Module 5 In this last module, caregivers were taught to implement strategies to increase their children's initiations. The first strategy involved allowing the children to express rejection of a disliked activity. We were cautious in discussing this strategy in that we did not want to encourage caregivers to force disliked activities on the children, nor did we want caregivers to stop a disliked, but necessary, activity every time the child expressed rejection. Surprisingly, caregivers were quite adept at figuring out how to use this strategy well. Twenty-five caregivers attempted to use this strategy, all identified a behavior displayed by their child to express rejection. Many caregivers added their own creative responses to these behaviors. For example, one added music to a disliked activity to soothe her child, another

changed the child's position to a more comfortable one, several added a toy or a game to distract their child's attention from the disliked activity.

The next set of strategies were designed to increase initiations and to encourage the children to initiate attention. Of the 24 caregivers (96%) who attempted the strategies to increase initiations, 19 (79%) reported success, while 5 (21%) reported no or unclear responses. Twenty-three caregivers (92%) attempted to encourage their children to initiate attention; 18 of these (78%) reported success. These infants were reported to demonstrate initiation behaviors within the carefully structured context of a familiar activity and under the keen observation of their caregivers. It should be noted, that by the end of the project, the majority of infants required additional opportunity to experience the strategies in Module 5, in order to fully acquire and generalize their initiation skills.

Caregiver use of Cues as Reported at the Initial Interview and the Follow-up Interview

Initial interview data was gathered from a total of 27 families (13 in California and 14 in Utah) before they began the curriculum, and 25 of them completed the curriculum. At the end of the project, 23 of these 25 families (92%) completed the follow-up interview (12 in California and 11 in Utah). Several key questions related to the goals of Project PLAI regarding caregiver use of cues from these interviews are reviewed here.

First, caregivers were asked to identify the types of cues they typically used with their babies. Table 1 displays the results, in percentage of caregivers reporting the use of each type of cue, at the initial interview and the follow-up by the California and the Utah sample, and by the total sample. Only those caregivers who completed both interviews ($n = 23$) are included in this analysis. At the time of the initial interview, caregivers identified using touch cues most frequently (used by 14 of the 23 caregivers). Use of auditory, visual, and object cues were also common. Only one caregiver mentioned using a kinesthetic cue, while no caregivers mentioned olfactory cues. By the follow-up interview, an increase in both the number and types of cues identified was noted. Object cues were the most frequently identified (by 21 out of 23 caregivers), but high rates of all other cues, including kinesthetic and olfactory cues were noted as well. Object cues and touch cues are subsets of tactile cues, so in combination - tactile cues were the most commonly used.

In general, a higher percentage of the Utah sample reported using various cues at the

initial interview than the California sample. This may be due to the fact that the Utah interventionists tended to be more highly trained than the California interventionists, with a particular emphasis on the INSITE curriculum model (Watkins, 1989) in the Utah which includes the use of cues. There was considerably less difference on the follow-up interview, however, suggesting that both groups were able to benefit from the Project PLAI emphasis on consistent and appropriate cue usage.

Table 1

Percentage of Caregivers' Reporting They Used Various Types of Cues at Initial Interview and at Follow-up Interview for the California and the Utah Samples and for the Total Sample

CUE	California (n = 12)		Utah (n = 11)		Total (n = 23)*	
	INITIAL	FOLLOW-UP	INITIAL	FOLLOW-UP	INITIAL	FOLLOW-UP
Touch	50%	83%	73%	91%	61%	87%
Object	50%	100%	64%	82%	57%	91%
Auditory	50%	58%	82%	82%	65%	70%
Visual	42%	83%	55%	82%	48%	83%
Kinesthetic	8%	67%	0%	64%	4%	65%
Olfactory	0%	58%	0%	55%	0%	57%

* Note: Although 25 infants and caregivers completed the curriculum, two families (1 in California and 1 in Utah) were not available for the follow-up interview.

As part of the first question, caregivers were also asked to identify the activities in which these cues were typically used. At the initial interview, playtime, bath time, and feeding were the most frequently mentioned activities. By the follow-up interview, however, a greater variety of activities was noted. Cues were reported used for dressing, anticipating the start of a new activity, recognition of objects and people, positioning, games, and other activities in addition to those mentioned at the initial interview.

The second question asked caregivers to discuss what their use of cues was helping their babies learn to do. The most frequent response on the initial interview was *"learn to anticipate activities"* (11 out of 27 caregivers or 41% mentioned this). On the follow-up interview, this remained the most frequent response (9 out of 23 caregivers or 39%), followed by *"learn to do things independently"* (5 out of 23 caregivers or 22%) and *"learn to communicate"* (2 out of 23 or 9%).

The next question asked how cues helped the caregiver and child communicate. Only 2 caregivers (7%) were able to generate an answer to this question at the initial interview. One stated that cues helped them communicate better, while the other stated that cues helped her know when her child needed something. On the follow-up interview, 8 caregivers (35%) stated that cues helped them communicate better, 7 (30%) stated that cues helped the child anticipate and predict, and 4 (17%) mentioned that cues helped them understand the child's needs.

Caregivers were also asked if their child initiated intentionally (i.e., purposefully tried to get their attention). Twelve out of 27 caregivers (44%) answered "yes" to this question on the initial interview. By the follow-up, the number of positive responses grew to 20 out of 23 (87%).

Finally, caregivers were asked to identify the frequency with which their children expressed certain emotions (e.g., happy, sad, angry, frustrated) or needs (e.g., hungry, tired, sleepy, needing attention). A total of 14 emotions or needs were listed; caregivers were asked to rate their child as clearly expressing each of these "never," "sometimes," or "always." Table 2 displays the percent of each of these responses across all items for both the initial interview and the follow-up interview.

Table 2
Caregiver Ratings of the Frequency of their Children's Expression of Emotions and Needs: Percent of Each of Three Possible Responses across all Items for Both the Initial Interview and the Follow-up Interview

	Never	Sometimes	Always
Initial Interview (n=27)	20%	37%	43%
Follow-up Interview (n=23)	16%	24%	60%

Taken together, these results suggest that caregivers became more sophisticated in their knowledge of and use of cues through their participation in the project. In addition, caregivers seemed to view their children's behaviors as more purposeful or intentional by the end of the project. Finally, caregivers learned to more consistently identify more of their children's needs and emotions.

Post Curriculum Feedback from Participating Caregivers

Two methods were used to elicit feedback from project participants as they completed the project: annual focus group meetings and an individual post-curriculum interview. The annual focus group meetings solicited feedback from caregivers and early interventionists regarding the implementation of the PLAI strategies. Questions explored what participants liked and disliked about the curriculum, as well as what participants felt they learned from the curriculum. After they had completed the entire curriculum, each family received a follow-up interview by phone or by a written questionnaire which they mailed to the project.

Focus group results. Focus groups were conducted once a year resulting in three in California (1996, 1997, 1998) and two in Utah (1997,1998). As in all project activities, we provided a small honorarium for parents and early interventionists participating in the focus groups to compensate for their time and travel costs. Meetings were held on the weekends so that working parents could attend and because travel was more convenient. The four focus group meetings during 1997 and 1998 (2 in Utah and 2 in California) provided the data for this analysis. A total of 54 parents (22 in California and 32 in Utah), including primary caregivers and their significant others, participated in these focus groups. All project participants (who were in the process of completing or who had completed the curriculum) were invited each year so some primary caregivers participated in both meetings while a few (4 out of 25 who completed the curriculum) did not attend any. Similarly, a total of 15 early interventionists and program service providers (10 in California and 5 in Utah) also participated. Early interventionists were assigned to the same small groups as their families.

At the focus group meeting, participants were assigned to a small group led by a project staff member. In southern California, we had two English-speaking small groups and one Spanish-speaking group for families and service providers who could communicate in a common language. Participants responded to a standard set of questions about the project (participants had received a copy of these before the meeting so that they could also prepare a written response). Group responses were recorded during the actual meeting by an additional project staff member. Quantitative data analysis techniques were then used to search for trends in these responses. The results for the caregivers' responses follow.

In response to the question, "How has your child and family benefited from Project

PLAI activities?", participants identified several key things they learned from the modules. The most common responses included *"learned to use cues"* (mentioned 19 times), *"a better understanding of my child"* (17 times), *"learned to communicate more better with my child"* (15 times), *"learned how to help my child more"* (10 times), and *"learned to wait for my child's response"* (9 times). In addition, caregivers reported that they learned how to observe their child (7 mentions), how to tell others about their child's communication strategies (6 mentions), and that the whole family learned how to have fun with their child (6 mentions). They also mentioned learning to interact better, turntaking, learning to interpret child's behavior, repetition, and use of routines as skills gained from the project.

In response to, "What did you like about the project?", participants mentioned *"working more closely with the early interventionist"* and *"meeting other parents"* most often (8 times each). In addition, caregivers liked the videotapes of their child (7 mentions). They liked learning to be better observers (6 mentions), and they found learning about their child's states and cues to be helpful (4 mentions). Surprisingly, the paperwork (recording sheets) was mentioned as the most liked activity 5 times. Caregivers also identified focusing on what the child could do, use of cues, activities that worked, and the fact that the project built on activities that were already taking place in the home as positive aspects of the project.

Caregivers were asked what they disliked or found difficult about the project. Being videotaped was identified as the most difficult part (mentioned 18 times), while completing paperwork was also very disliked (17 mentions). Some caregivers stated that the project took up too much time or went on too long (7 mentions), while others suggested it was too fast (3 mentions). It was difficult when the child could not keep up with the activities (3 mentions), and guilt about that was expressed as well (2 mentions).

We asked caregivers for their suggestions about improving the process. *"Have more contact with parents"* was mentioned most often (8 times), along with *"more monitoring and follow-up"* (4 mentions). *"Do more videotaping"* received 5 mentions, as did *"do less videotaping"*. Developing some type of reference handbook or more specific handouts for parents was a common theme (7 mentions). Also identified were having both parents fill out the forms, reducing the paperwork, shortening the curriculum implementation process, and providing more time for the completion of the curriculum.

Participants were asked if they would continue to use aspects of the curriculum with their child or with other children. No caregiver said they would stop using aspects of the curriculum. When asked which specific parts of the curriculum they would continue to use, caregivers mentioned *"use of cues"* most often (10 times), followed by *"observation"* (6 times), *"wait time"* (6 times), *"use of routines"* (5 times), and *"use play to develop skills"* (3 times).

Finally, participants were asked if they would recommend the project to other families. Not one family said "no". Caregivers' comments included *"There is nothing to lose and so much to gain"*, *"It has been so helpful and easy for me to learn"*, and *"Thanks to the project we are able to understand the baby more"*.

We also reviewed the transcripts of the 4 focus group sessions to identify key words participants used to describe the benefits of the curriculum. *"Communication"* was the most commonly used term (used 43 times), while *"cues"* was a close second (used 39 times). That the curriculum was *"helpful"* or *"useful"* was mentioned 27 times, as was the term *"understand"* in relationship to what the curriculum helped them do. Caregivers noted that they learned to be more *"responsive"* (mentioned 17 times) and more *"aware"* of their child's needs (mentioned 15 times). In addition, they felt that the curriculum helped them *"interact"* more with their child (used 15 times).

Overall, the feedback from the focus groups was positive. Caregivers felt that they had learned some valuable skills through participation in Project PLAI. Although some caregivers found some aspects of the curriculum unpleasant or difficult (in particular the paperwork and the videotaping), they acknowledged that these were necessary evaluation components of a federally funded research-to-practice project. Their repeated use of key words and concepts emphasized by the curriculum indicates that they "got the point" of the curriculum. Most caregivers could identify strategies they found particularly successful as well as ones they would continue to use with their child.

Follow-up interview. The individual follow-up interview asked 3 specific questions to probe caregivers' perceptions of the benefits of the project. First, caregivers were asked how their experience with the curriculum changed the way they interacted with their child. Seven out of 23 caregivers (30%) stated that they learned to communicate better with their child.

Five (22%) mentioned that they could identify the child's needs better. Four (17%) expressed that they were more sensitive in their interactions. In addition, 2 caregivers (9%) mentioned spending more time 1-to-1 with their child, and 2 caregivers (9%) noted that they learned to wait longer for a response from their child. Also mentioned were learning to observe their child (1), establishing turntaking (1), use of routines (1), increased child independence (1), and developing a more optimistic outlook (1).

Caregivers were also asked to identify things they did differently now that they hadn't done before participating in the PLAI curriculum. "*Use cues*" was mentioned most often (by 10 out of 23 caregivers or 43%); an additional 3 caregivers (13%) mentioned that they now involve other family members in using cues also. Three caregivers (13%) stated that they observed their child more now, 2 (9%) stated that they wait longer for a response from their child. Also noted were using strategies to have the child do more independent movements (2 caregivers or 9%), doing more things together with their child (2 caregivers or 9%), and using more ways to communicate (1 caregiver or 4%).

Finally, caregivers were asked what changes they had noted in their child. Most often cited was that the child now anticipated and participated more in activities (17 out of 23 caregivers or 74% stated this). Seven caregivers (30%) stated that their child communicated more, while 3 (13%) noted that their child was more relaxed. Increased response to commands was cited by 2 caregivers (9%). In addition, more awareness of the environment (2 or 9%), more exploration (2 or 9%), and more independence (2 or 9%) were noted. Receiving 1 mention each were becoming more social, making more choices, and using objects to get attention.

From these responses, we can infer that project participants felt that they had learned helpful strategies from the Project PLAI curriculum. Information on the use of cues was particularly meaningful, but caregivers also learned to be better observers of their child and better interpreters of the meaning of their child's behaviors. Participation in the project seemed to support an increase in communication between caregivers and their child, resulting in the child's increased awareness of activities and people in the environment.

Post-Curriculum Feedback from Participating Early Interventionists

We sought feedback from participating early interventionists throughout the project,

both informally, through ongoing interactions, and formally, through the yearly focus groups and through periodic post-module interviews. Data from the formal procedures follows.

Focus group feedback All early interventionists attended at least one focus group meeting. A number of factors influenced their participation. In California, our June focus group meetings were held during the summer break and some early interventionists were on vacation. Over the years, three early interventionists in both states changed jobs and were no longer involved in the project. Data from four focus groups (2 in Utah years 1997-1998 and 2 in California years 1997-1998) representing feedback from a total of 15 early interventionists and service providers were used for the following analysis.

In response to the question, "How has the child and family you worked with benefited from Project PLAI activities?", interventionists identified *increased communication between parent and child* most often (7 mentions). They also mentioned that the *caregivers learned observation skills* (5 mentions), that *they bonded more closely with their infants* (4 mentions), and that *they learned to break things down into small steps* (1 mention).

In response to, "What did you like about the project?", participants mentioned the information on *states and cues* (2 times), the emphasis on *communication fundamentals* (3 times), *easy steps in the curriculum and organization of materials* (5 times) and *opportunities to meet other professionals* (3 times). Early interventionists also commented that the *revised recording sheets were easier to use than the old ones* (2 times).

Early interventionists were asked what they disliked or found difficult about the project. They mentioned the *paperwork* (5 times), the *videotaping* (4 times), a *sense of pushing the child along even when things weren't working* (3 times), the *lag time between being trained in a module and when they implemented it with a family* (2 times) and the *repetition of the curriculum* (1 time).

We asked these participants for their suggestions about improving the process. Interventionists suggested developing a *pre-training videotape* to help with concepts (6 mentions), availability of *portable VCRs* for families without one (1 mention), *reducing the use of videotaping* (1 mention), *increasing teaming opportunities* with other service providers (1 mention) and *developing mentor families* (1 mention).

Participants were asked if they would continue to use aspects of the curriculum with

their target child or with other children they might work with. In addition they were asked if they would recommend the project to other families. All said, "Yes," to both questions. Six early interventionists indicated that they were already using the curriculum strategies with other children and families who were not in the project. Early interventionists in southern California reported feeling more competent in providing services to infants with multiple disabilities/visual impairment and hearing loss. Several of them stressed the primary importance of including communication outcomes on IFSPs for these infants and families.

Post-module interviews The individual post-module interviews were conducted with early interventionists as they completed each module with a family. Complete data from 13 early interventionists or designated service providers regarding the participation of 16 project families was available for this analysis. Early interventionists were asked specific questions designed to probe the usefulness of each set of activities within a module.

- 1) did the activities in the module elicit the information that you needed from the parent or caregiver (elicit needed info),
- 2) were there any questions in the module that were difficult for the parent to respond to (difficult questions),
- 3) were there examples in the module that were particularly helpful (helpful examples),
- 4) if you used the videotapes, did you find them helpful (video helpful), and
- 5) approximately how much time was needed to complete the module (time)?

The quantitative aspects of these interview results are presented in Table 3, for questions 1 through 4, and Table 4, for question 5. In general, early interventionists found the activities to be useful, while the recording sheets supported the completion of module objectives. Parts of the curriculum that seemed more difficult or complicated to explain/implement included the "ABC" activity, identification of likes and dislikes, identifying new cues, and developing turntaking games (when the child had difficulty with the "request for more" activity). We provided early interventionists with videotape segments for 3 selected objectives of the curriculum (*Objective I-B: Caregivers will learn to identify the infant's state of arousal; Objective I-C: Through careful observation of antecedent events and consequences, caregivers will develop a clear understanding of the infant's typical reactions in routine events activities; Objective IV-A: using information gained in previous modules,*

caregivers will learn how to encourage infants to request "more" of a desired food or activity)

However, few early interventionists felt comfortable with the use of videotape review, thus these segments were generally not reviewed appropriately with families. Those who did use the tapes with caregivers, however, generally found them helpful.

Table 3

Summary of Post-module Interviews with Early Interventionists (n = 16)

Questions	Module 1			Module 2			Module 3			Module 4			Module 5		
	yes	no	n/a*	yes	no	n/a*	yes	no	n/a*	yes	no	n/a*	yes	no	n/a*
Elicited needed info?	15	1	0	10	0	6	15	0	1	15	1	0	10	4	2
Difficult questions?	10	6	0	5	9	2	6	8	2	5	10	1	2	12	2
Helpful examples?	15	1	0	12	0	4	13	0	3	10	3	3	10	2	4
Video helpful?	**8	6	2	3	1	12	2	1	13	**3	0	13	1	1	14

* n/a = information not available OR not applicable

** video tape segments provided for use in Modules 1 & 4

As discussed previously, families took an average of 13.8 months from beginning baseline interviews and video observations to completing activities in Module 5. Table 5 shows the time it took to complete each module with families as reported by early interventionists.

Table 4

Percent of Interventionists' Reporting Various Ranges of Amounts of Time Needed to Complete each Module with a Family by (n = 16)

Time Range	Module 1	Module 2	Module 3*	Module 4	Module 5
> 1 month	13%	31%	38%	50%	44%
1 - 2 months	56%	31%	31%	38%	25%
3 - 4 months	6%	0%	13%	0%	6%
< 4 months	6%	0%	0%	0%	0%
no estimate	19%	38%	19%	13%	25%

* Module 3 contains the most number of objectives and activities

Analysis of Videotapes

For evaluation purposes, caregivers were videotaped over time as they interacted with their infant in both playtime and bath time situations. Videotapes were taken at baseline (entry into the project) and after completion of Modules 1, 3, 4, and 5. These videotapes were later coded for two specific purposes: caregivers' use of cues to help their child anticipate activities and aspects of caregiver and child interactive behaviors. An analysis of each of these follows.

Caregiver use of anticipatory cues. We defined cues as actions taken by the caregiver to let a child know that something was about to happen, for the purpose of helping the child anticipate activities and event. Cues could be in the form of auditory, visual, touch, object, or kinesthetic signals. Two independent raters coded the frequency of cue usage at three data points from each family's videotapes: baseline, upon completion of Module 3 (where use of cues was introduced), and upon completion of Module 5. A total of 24 families were coded across the 3 data points. The caregivers' total use of cues at each data point was calculated, as was the number of events cued within an activity (e.g., at bath time: going into the water, before shampooing, before being towed off). Paired samples t-tests were run to identify differences in total use of cues and number of events cued between baseline and Module 3, baseline and Module 5, and Module 3 and Module 5 for both bath time and playtime.

A significant difference between total cues used at baseline (mean = 2.50) and total cues used after Module 5 (mean = 5.50) was noted for the bathtime situation ($t = -2.31$, $p < .01$). There was also a significant difference for bathtime between number of events cued at baseline (mean = 2.54) and number of events cued after Module 5 (mean = 3.91; $t = -2.21$, $p < .05$). Although cues used in the playtime situation increased from baseline (mean = 1.37) to Module 5 (mean = 2.29), this difference was not significant.

Caregiver and child interactive behaviors. A rating scale was developed to code the videotaped interactions between the infants/toddlers and their caregivers during bath-time and play-time. The scales were based on those originally developed by Crawley and Spiker (1993) for use with interactions involving toddlers with Down syndrome and their mothers. These scales tap important caregiver and infant/toddler interactive behaviors, as well as overall dyadic qualities.

For the purposes of this study, modifications were made in several of the original

subscales to make them more pertinent to a younger group of children as well as a more significantly disabled group of children. Several new items were added, including orientation to sound and orientation to visual stimuli. Throughout, changes and additions were made in order to better reflect the unique characteristics of the Project PLAI target population. Figure 1 displays the characteristics rated on the PLAI Caregiver-Infant/Toddler Rating Scales.

PLAI Caregiver-Infant Toddler Rating Scale (PLAI-CITRS)

Infant/Toddler Ratings:

- A. Social Maturity - degree of interest in and responsiveness to the caregiver
- B. Independence of Movement - ability to move about and manipulate environment
- C. Action on Objects - degree of interest in and attention to objects
- D. Readability of Communicative Attempts - clarity of attempts at communication
- E. Animation - alertness of facial expression and body tone
- F. Orientation to Sounds - displayed awareness of sounds in the environment
- G. Orientation to Visual Stimuli - displayed awareness of visual stimuli

Caregiver Ratings:

- A. Directiveness - how much the caregiver controls the interaction
- B. Elaborativeness - use of behaviors that complement and extend the child's lead
- C. Sensitivity - degree of awareness and responsiveness to child's cues
- D. Pacing - appropriateness of the caregiver's presentation of activities, requests, etc
- E. Developmental Appropriateness of Play - adjustment of activities to child's level
- G. Readability of Caregiver - clarity of behaviors and coherence of actions
- H. Intrusiveness - degree to which behaviors abruptly interrupt the child's activities

Dyadic Ratings:

- A. Mutuality of Dyadic Interactions - degree to which both partners are attending to the same activity or event (joint attention, turntaking, etc)
- B. Mutuality of Goals - degree to which the goals of the interaction are shared
- C. Mutuality of Responsibility - degree to which each member of the dyad seems responsible for initiating and sustaining communicative episodes

Figure 1. Description of behaviors rated on the PLAI Caregiver-Infant/Toddler Rating Scale (PLAI-CITRS)

Two independent coders rated each tape of caregiver-child interactions using the PLAI-CITRS in the following way. Coders viewed a videotaped session of caregiver and infant one time through to get an overall feel for the dyad. Immediately following this viewing, coders viewed the tape a second time and then rated the child's behaviors on the appropriate subscale. After all the tapes for a particular Module were rated in this manner, coders viewed the tapes a third time and then rated caregiver behaviors. Finally, after rating all caregiver behaviors for a particular Module, coders viewed the tape a fourth time and then rated dyadic behaviors.

Inter-rater reliability was established in two ways. First, coders periodically met to share their results, reviewing the tapes and coming to a consensus where there were disagreements. Second, the two coders' results were correlated. Items that did not achieve reliability at .75 or better were discarded from the analysis.

For the purpose of project evaluation, we were particularly interested in changes in caregiver behaviors (specifically directiveness, sensitivity, and responsiveness) during their participation in project activities. Paired t-tests were run to look for differences between baseline and completion of Module 3 and between baseline and completion of Module 5.

Significant differences were found between baseline and completion of Module 5 for bathtime on caregivers' degree of directiveness (from baseline mean = 1.71 to post-Module 5 mean = 2.29, $t = 3.08$, $p < .05$). Sensitivity during bathtime also increased from baseline (mean = 3.33) to post-Module 5 (mean = 3.83, $t = 2.30$, $p < .05$). Elaborativeness during bathtime increased significantly from baseline (mean = 2.63) to post-Module 3 (mean = 3.08, $t = 2.54$, $p < .05$), but the difference between baseline and post-Module 5 (mean = 2.75) was not significant. No significant differences were noted for these caregiver behaviors across time during the play activities.

These results reflect changes in caregiver behaviors that may have been due to their participation in Project PLAI activities. For example, the increase in elaborativeness noted between baseline and post-Module 3 is somewhat consistent with the increase in the use of cues noted previously. Elaborativeness involves complementing and extending the infant's actions and responding to behaviors that may be interpreted as communicative. It includes adding cues to the interactive situation to facilitate the infant's understanding. In the first three Modules of Project PLAI, emphasis is placed on observing and interpreting the child's behaviors as well as use of cues, thus an increase in these skills suggests success in meeting the goals of Modules 1 - 3.

The increase in both directiveness and sensitivity between baseline and post-Module 5 also supports the attainment of project goals. Modules 4 and 5 emphasize attending to and responding to subtle infant cues that may be interpreted as requests for more and turntaking behaviors. Sensitivity reflects the caregivers awareness of the child's signals and their quick and appropriate response to these behaviors which are directly taught in the PLAI curriculum.

Directiveness, on the other hand includes prompting the child to get a response, and directing a child in what to do until an appropriate response is attained. The emphasis on developing the infant's turntaking and initiating skills found in Modules 4 and 5 support an increase in caregiver's directive behaviors as the caregiver may need to be more directive initially in order to elicit a response from the infant (e.g., set up a specific activity, provide a clear pause, wait for the child's response, prompt a response if needed, etc.)

Interestingly, these differences were only found for the bath time videotapes, not for the play time tapes (although the trend was similar for play time, the differences were not significant). One possible explanation is that the project emphasized naturally occurring activities for the implementation of cues and games. Most caregivers selected bath time as a place to introduce new cues, and many found bath time to be appropriate for the introduction of request for more and other turntaking activities. Bath time was also stressful for a number of the children prior to the introduction of Project PLAI activities, and thus an activity that caregivers were motivated to change. Less emphasis was placed on play, as this was felt to be an artificial activity for many caregivers, one with a goal of showing off what the child could do rather than accomplishing a task within a predictable daily routine.

We plan to continue to explore these data to provide a more descriptive analysis of the relationship between caregiver and child interactive behaviors within this unique population. These findings will be used to disseminate information about the project and curriculum through articles submitted to professional journals.

Summary

Overall, the results discussed above suggest that Project PLAI was successful in implementing its objectives:

1. To identify and promote contingent responses to infant behaviors which in turn motivate infant learning and exploration
2. To identify compensatory interactions strategies which take into account the infant's degree of vision and hearing impairments and other disabilities
3. To develop, implement, and evaluate "contingency games" as a means of promoting caregiver-infant interaction within the natural context of everyday routines
4. To support and develop caregiver satisfaction and feeling of competence in the role of

caring for an infant who is deaf-blind.

Objectives 1, 2, & 3 were addressed in specific modules of the curriculum and accomplished through its implementation. Caregivers were able to complete the activities and seemed to learn the skills emphasized in the curriculum. Objective # 4 was accomplished by the caregivers' expressed satisfaction with their participation and a desire to continue to use the new skills they had acquired. Most significantly, they identified an increase in the amount and the quality of communicative interactions between themselves and their children as well as an increased sense of efficacy in observing and responding to their children's needs. Quantitative evidence suggests meaningful changes in caregiver behaviors consistent with project activities.

Early interventionists also seemed to benefit from their participation in Project PLAI. In particular, for the early interventionists in California, the emphasis on the use cues and specific strategies for developing communicative behaviors seemed most useful. The Utah early interventionists, who were generally more knowledgeable about cues and communicative behaviors, also benefited from the systematic and individualized application of these strategies as emphasized in the PLAI curriculum.

Environmental Influences

The complexity of the early intervention system in southern California influenced the outcomes of the project. First, we were unable to recruit and retain 36 infants and families in the project as originally proposed for several reasons. Under P.L. 99-457, in California, infants with low incidence disabilities (visual impairment, hearing loss, deaf-blindness and no additional disabilities) are served by school district programs while other all other infants with disabilities (including those with cognitive delays and multiple disabilities include visual impairment and/or hearing loss) are served by private infants programs vendored by Regional Centers funded by the Department of Developmental Services. These different programs were identified in previously as private or public. However, if school districts had served infants with a range of disabilities before the passage of P.L. 99-457, they were mandated to continue these services. So in reality, some school districts served a variety of infants and a single infant may receive services both from a school district and vendored infant program. School districts require that their early interventionists have certification while vendored infant

programs have no personnel standards except that a supervisor needs a master's degree. In California, specialized certification in deaf-blindness was discontinued in the early 1980s. Consequently, in a school district program, infants who are deaf-blind may receive services from the infant program for visual impairments, from the infant program serving infants who are deaf or hard of hearing, or from a generic early intervention infant program (if the school district has one). Early interventionists in these programs have a variety of credentials in special education.

Infant programs vendored by the Regional centers are contracted for a specific number of hours of contact and services with an infant. Some early interventionists in these programs were reluctant to implement new strategies which focused on working with parents and enhancing the early communication development of the infants- although they received an honorarium for the implementation of the curriculum modules. They viewed their responsibilities as working on specific intervention activities with infants to stimulate development as documented on the IFSP. Other early interventionists could not commit the time to the required training, meetings, and paperwork - although they were compensated for their time and received continuing education units for the inservice course.

Second, the nature of the lowest of the low incidence disabilities and infants as the target sample, influenced the recruitment process. The frequent occurrence of illness and hospitalization of infants prevented several families from beginning the curriculum after baseline was obtained and contributed to 5 infants who did not complete the curriculum (two of these infants died). In two situations, identified infants were in foster care and foster parents did not have the authority to consent to having the infant videotaped. Another challenge was the lack of early reliable identification of infants with visual impairment and hearing loss especially when they have multiple disabilities. In some cases, other medical survival needs took priority, while in other cases, visual impairment was diagnosed but the infant's hearing status was unknown. Several families - especially those who did not speak English- did not know how to advocate for ophthalmological and audiological evaluations for their infants. Even when infants were diagnosed as having a visual impairment and hearing loss, few received corrective lenses or hearing aids when appropriate, and the majority of those who had glasses or hearing aids did not wear them consistently. We believe this lack of

follow up on amplification and corrective lenses was influenced both by the infant's medical needs and the lack of qualified personnel in southern California working with these infants. Few early interventionists were trained in the specialized needs of infants with visual impairments or hearing loss, and those with severe disabilities. Similarly, audiologists and ophthalmologists were not experienced in testing infants with multiple disabilities. Due to insurance or financial difficulties, some families had not obtained the hearing aids or glasses that were prescribed for their infants and some early intervention programs failed to provide follow-up support in this area.

Implications for Practice

Our experience in Project PLAI activities and the evaluation results identified several critical needs in providing appropriate early intervention services to infants who are deaf-blind and their families. First, the shortage of qualified personnel serving these infants and families requires concerted preservice and inservice efforts to increase professional competencies not only in specialized skills related to the infant's multiple disabilities, but also in generic skills related to coaching families in communication strategies with their infants, encouraging the infant's use of hearing aids and glasses when prescribed, and infusing intervention strategies with the family's routine. Additionally, the multiple learning needs of infants who are deaf-blind require qualified professionals who can assist families in obtaining the appropriate medical treatments, ophthalmological and audiological services, and other related services.

The large Spanish-speaking population in southern California requires the recruitment and training of bilingual early interventionists, as well as the development of more materials for families in Spanish. Second, the complexity of these infants' learning needs demands a team approach which provides opportunities for these service providers to meet and plan together, and requires ongoing professional development opportunities for these service providers. Third, families of these infants, especially receiving services primarily through home visits, need regular opportunities to share information with other families and service providers. Spanish-speaking families are more comfortable participating in groups with others who speak their language, and using materials that are in Spanish. These opportunities will become even more essential if California's interpretation (based on IDEA 1997) of "natural environment" as a place which would exist if there were no infants with disabilities is fully

implemented. Finally, given the frequency with which object and touch cues were used (as reported by our evaluation results) with these infants, there is a need to examine and identify the characteristics of tactile cues to determine their particular usefulness for an individual infant and to ways assist the infant's understanding of their meaning.

Project Outcomes

During the past three years, we have provided indepth training on the PLAI curriculum to 39 early intervention personnel in 14 programs and introductory sessions to almost 2000 service providers and caregivers. We have produced the 5 module curriculum (with handouts for caregivers in English and Spanish), a videotape demonstrating early communication strategies (in English (closed captioned) and Spanish) and a discussion guide to accompany the tape. It is anticipated that these materials will be disseminated by a commercial publisher so that the Project PLAI model will be available nationwide. However, our most prized outcome is the increased sense of competence expressed by caregivers as captured in these comments: *"Project PLAI teaches the parents how to communicate, not the children."* *"PLAI gave us a new way of looking at her- as a caregiver and playmate- rather than as a therapist for medical needs."* *"I put a list of his communication behaviors and cues over his crib in the hospital for the nurses to use."* *"I gave the video and PLAI forms to his new preschool program so they would know how to communicate with him."* *"Now we know how to interact with her and can teach others how to play with her."*

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Appendix A

Dissemination Activities

The Project PLAI curriculum, implementation activities, and preliminary results have been disseminated widely. The value of the curriculum is supported by the number of our proposals which have been accepted for professional conferences and the number of requests for inservice training on the curriculum that we have received. The major dissemination activities are listed below.

First, in May 1995, Drs. Chen and Haney published an article on the proposed project model in *Journal of Visual Impairments and Blindness*. Next, in the past 4 years, we have made presentations on the PLAI curriculum at over 16 state, national, and international conferences, professional development institutes and infused PLAI materials in courses at three different Universities. Dr. Chen and Dr. Haney presented at the curriculum outline at the International DeafBlind Association Conference, Cordoba, Argentina, July 1995, and the Zero to Three Conference, Atlanta, Georgia, November, 1995. Dr. Chen presented the Project PLAI curriculum at the California Transcribers and Educators of the Visually Handicapped Annual Conference, San Francisco, March 1996. Dr. Chen and Dr. Haney presented a five day course on early childhood special education strategies including the PLAI model for the New Mexico Deaf-Blind Services in June 1996. They also presented the Project PLAI curriculum and model at the Association for Persons with Severe Handicaps (TASH), New Orleans, November 1997 and at the Council for Exceptional Children- Division of Early Childhood (DEC) Annual Conference, in Phoenix, AZ, December 1996. Dr. Chen and Dr. Klein in separate workshops on related topics presented Project PLAI strategies at the Infant Development Association Conference in Irvine, CA, January 1997. Drs. Chen and Haney and Linda Alsop (Utah replication site coordinator) presented on the implementation of the Project PLAI curriculum at the National Conference on DeafBlindness, Washington, DC, June 1997. Dr. Chen and Haney made a similar presentation at the European DeafBlind Conference, Madrid, Spain, July 1997. Dr. Chen presented on the implementation activities of Project PLAI at the California Transcribers and Educators of the Visually Handicapped Annual Conference, Los Angeles, March 1998 and on the curriculum strategies at the

Contemporary Forums National Interdisciplinary Conference Addressing Issues in Early Development: Birth to Five Years, Anaheim, CA, April 1998. She also included selected PLAI strategies in the two day workshop on communication with children who are deaf-blind for the Western Australia Deaf-Blind Association, Perth, Australia and for the 5 day course at Renwick College, New South Wales, Australia, July 1998. Drs. Chen, Haney, Klein and Linda Alsop presented on the PLAI curriculum and preliminary results at the Canadian DeafBlind and Rubella Association, Mississauga, Ontario, Canada, August 1998. Drs. Haney and Klein, and Christina Pruess and Lavada Minor made a similar presentation at the Infant Development Association Conference, Sacramento, February, 1999.

In April 1999, Dr. Chen provided a 2 hour satellite training using some of the PLAI curriculum strategies for California Deaf-Blind Services. This was the most popular telecast of the California Deaf-Blind Services series and was carried by 2 cable channels and 35 downlink sites. In addition, she has infused the strategies from the Project PLAI curriculum into required coursework for candidates in the early childhood special education credential and master's program at California State University, Northridge, specifically in *Special Education 637 Methods in Low Incidence Multiple Disabilities*. This course is an elective for candidates in the deaf and hard of hearing specialization area. Dr. Klein has done the same at California State University, Los Angeles in the early childhood special education coursework. Through the SKI HI Institute, Linda Alsop has included the PLAI curriculum strategies in her inservice training for interveners working with children who are deaf-blind.

Future Plans

Dr. Chen has been invited by the Minnesota Deaf-Blind Services Technical Assistance Project to conduct a one day training on the PLAI curriculum for early interventionists in June 1999. Drs. Chen, Haney and Klein are scheduled to present the PLAI findings at the International DeafBlind Association Conference, Lisbon, Portugal in July 1999. Dr. Chen has also been invited to provide a 3 hour training on the PLAI curriculum to the Southwest region Early Intervention Conference, Phoenix, AZ January 2000. The videotapes and curriculum will be distributed by Paul Brookes Publishing. While reviews have been positive about the quality and need for the materials, the publisher is concerned about the low incidence focus and whether there will be an adequate market to justify the investment. We

have agreed to make minor wording changes so that it is clear that strategies are appropriate for a diverse group of infants with multiple disabilities and not just those who are deaf-blind. The anticipated publication date is Spring 2000. Drs. Chen, Klein, and Haney are in the process of developing manuscripts reporting on the project to be submitted to appropriate professional peer-reviewed journals, such as *the Journal of Visual Impairment and Blindness* and *Topics in Early Childhood Special Education*.